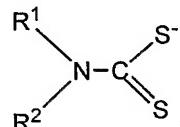
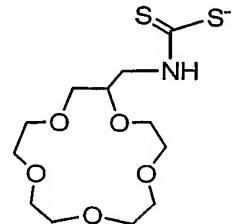


CLAIMS

1. A composition comprising a compound comprising a formula $(M\equiv N)L^1$ and pharmaceutically acceptable salts thereof;
wherein N is nitrogen;
- 5 M is a transition metal; and
 L^1 is a first crowned dithiocarbamate, wherein the first crowned dithiocarbamate comprises a first crown ether-containing group of formula $[(CH_2)_a-O]_b-(CH_2)_c$, wherein a is at least 2, b is at least 3, and c is at least 2.
- 10 2. The composition of Claim 1, wherein the first crowned dithiocarbamate comprises a formula:

and pharmaceutically acceptable salt thereof;
wherein R^1 or R^2 comprises the first crown ether-containing group, or
- 15 R^1 and R^2 together comprise the first crown ether-containing group.
3. The composition of Claim 1, wherein the transition metal is a radioactive metal.
- 20 4. The composition of Claim 1, wherein the transition metal is ^{99m}Tc or ^{94m}Tc .
5. The composition of Claim 1, wherein the transition metal is ^{186}Re or ^{188}Re .
- 25 6. The composition of Claim 1, wherein subscript a in the formula of the first crown ether-containing group is 2, 3, 4, or 5.

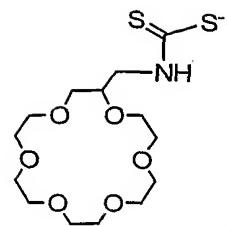
-70-

7. The composition of Claim 1, wherein subscript a in the formula of the first crown ether-containing group is 2 or 3.
8. The composition of Claim 1, wherein subscript a in the formula of the first crown ether-containing group is 2.
9. The composition of Claim 1, wherein subscript b in the formula of the first crown ether-containing group is 3, 4, 5, 6, 7, or 8.
10. 10. The composition of Claim 1, wherein subscript b in the formula of the first crown ether-containing group is 3, 4, 5 or 6.
11. The composition of Claim 1, wherein subscript c in the formula of the first crown ether-containing group is 2, 3, 4, or 5.
- 15 12. The composition of Claim 1, wherein subscript c in the formula of the first crown ether-containing group is 2 or 3.
13. The composition of Claim 1, wherein subscript c in the formula of the first crown ether-containing group is 2.
- 20 14. The composition of Claim 1, wherein the first crowned dithiocarbamate comprises

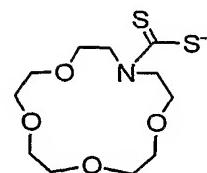


- 25 15. The composition of Claim 1, wherein the first crowned dithiocarbamate comprises

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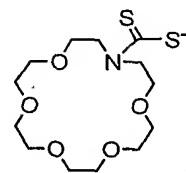


16. The composition of Claim 1, wherein the first crowned dithiocarbamate comprises



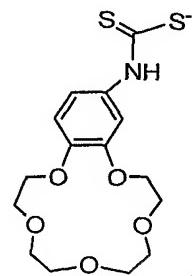
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17. The composition of Claim 1, wherein the first crowned dithiocarbamate comprises



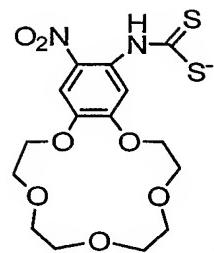
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18. The composition of Claim 1, wherein the first crowned dithiocarbamate comprises

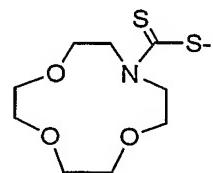


15 19. The composition of Claim 1, wherein the first crowned dithiocarbamate comprises

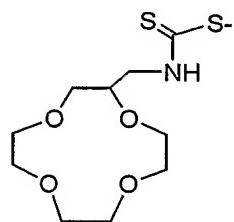
-72-



20. The composition of Claim 1, wherein the first crowned dithiocarbamate is selected from the group consisting of

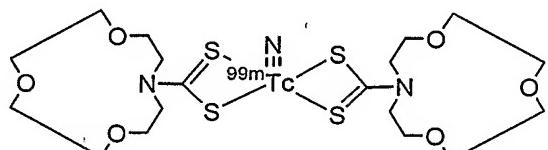


, and

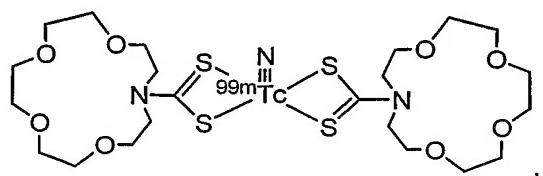


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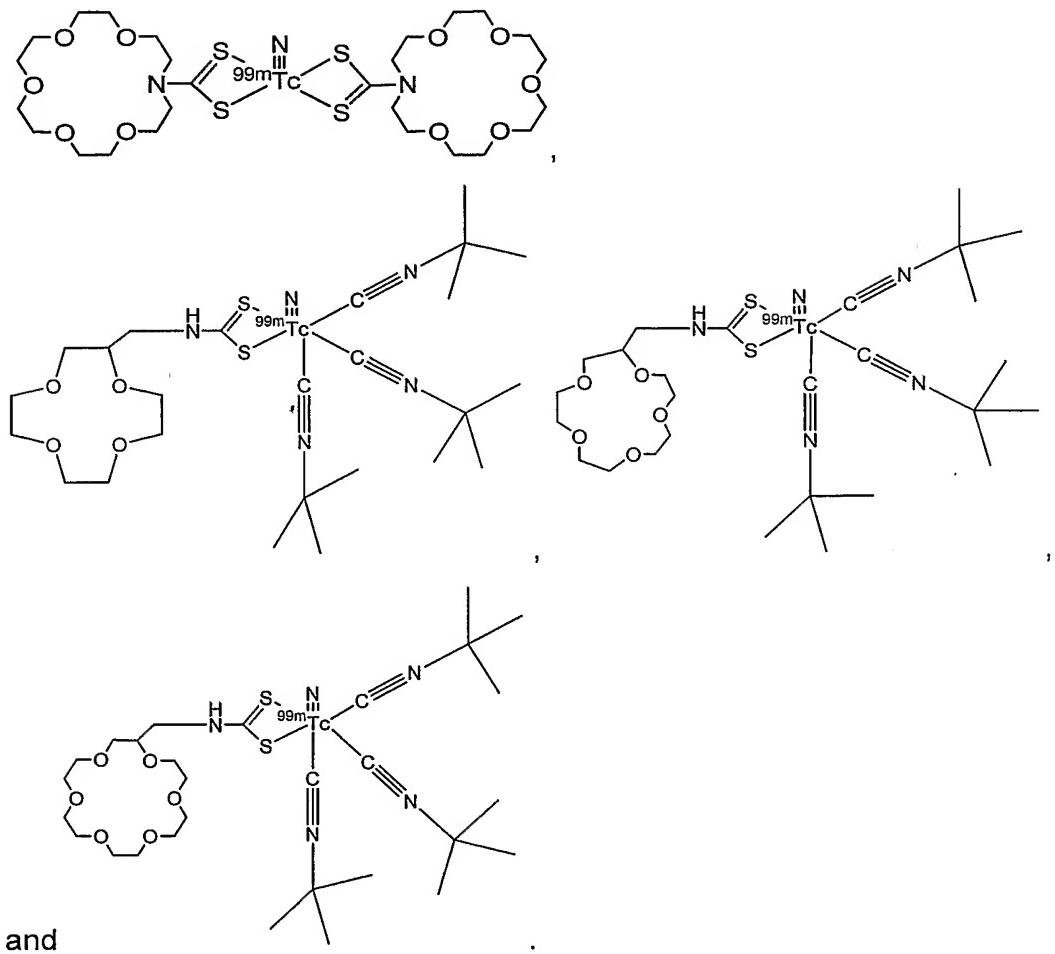
21. The composition of Claim 1, wherein the compound is selected from the group consisting of:



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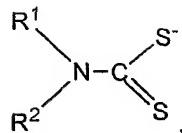
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5 22. The composition of Claim 1, wherein the compound further comprises
 L² and comprises a formula (M≡N)L¹L² and pharmaceutically acceptable salts
 thereof;

10 wherein L² is a second crowned dithiocarbamate, wherein the second
 crowned dithiocarbamate comprises a second crown ether-containing
 group of formula [(CH₂)_a-O]_b-(CH₂)_c, wherein a is at least 2, b is at least
 3, and c is at least 2.

23. The composition of Claim 22, wherein the second crowned
 dithiocarbamate comprises a formula:



and pharmaceutically acceptable salt thereof:

wherein R¹ or R² comprise the second crown ether-containing group, or R¹ and R² together comprise the second crown ether-containing group.

5

24. The composition of Claim 22, wherein subscript a in the formula of the second crown ether-containing group is 2, 3, 4, or 5.

25. The composition of Claim 22, wherein subscript a in the formula of the
10 second crown ether-containing group is 2 or 3.

26. The composition of Claim 22, wherein subscript a in the formula of the second crown ether-containing group is 2.

15 27. The composition of Claim 22, wherein subscript b in the formula of the
second crown ether-containing group is 3, 4, 5, 6, 7, or 8.

28. The composition of Claim 22, wherein subscript b in the formula of the second crown ether-containing group is 3, 4, 5 or 6.

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29. The composition of Claim 22, wherein subscript c in the formula of the second crown ether-containing group is 2, 3, 4, or 5.

25 second crown ether-containing group is 2 or 3.

25

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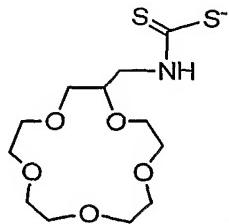
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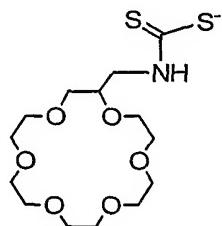
31. The composition of Claim 22, wherein subscript c in the formula of the

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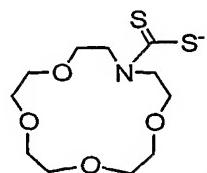
32. The composition of Claim 22, wherein the second crowned dithiocarbamate comprises



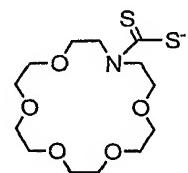
5 33. The composition of Claim 22, wherein the second crowned dithiocarbamate comprises



10 34. The composition of Claim 22, wherein the second crowned dithiocarbamate comprises



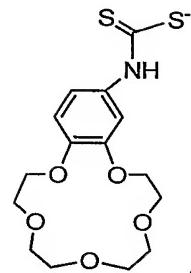
35. The composition of Claim 22, wherein the second crowned dithiocarbamate comprises



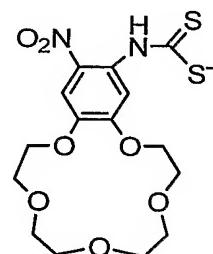
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36. The composition of Claim 22, wherein the second crowned dithiocarbamate comprises

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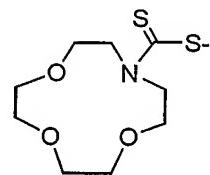


37. The composition of Claim 22, wherein the second crowned dithiocarbamate comprises

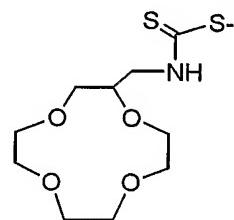


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38. The composition of Claim 22, wherein the second crowned dithiocarbamate is selected from the group consisting of

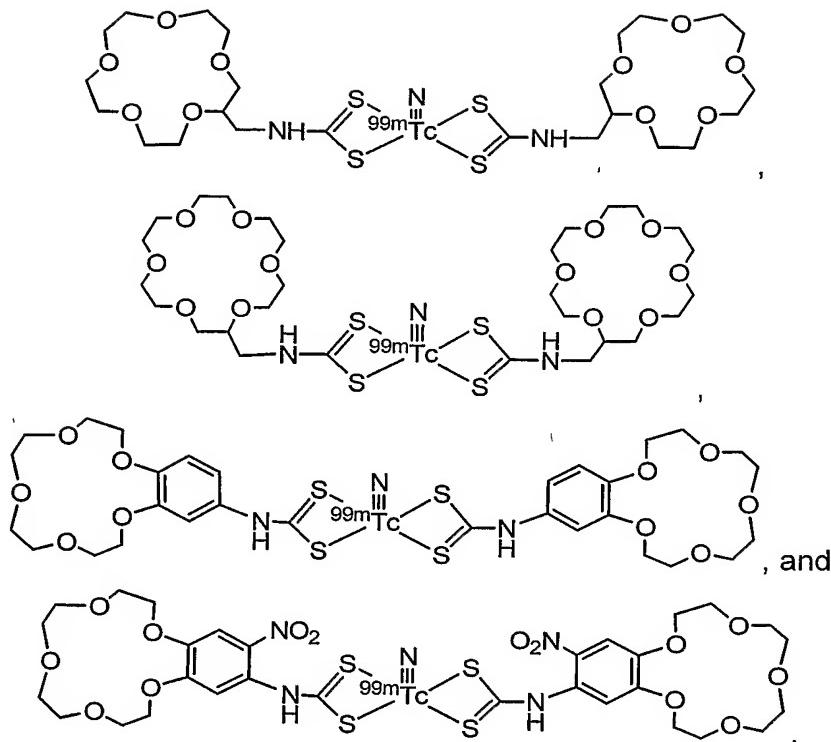


, and



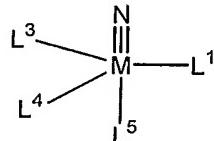
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39. The composition of Claim 1, wherein the compound is selected from the group consisting of:



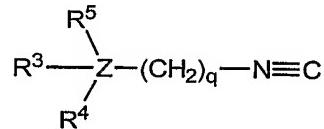
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40. The composition of Claim 1, wherein the compound further comprises L³, L⁴, and L⁵ and comprises a formula:



and pharmaceutically acceptable salts thereof;

10 wherein L³, L⁴, and L⁵ each comprises an isonitrile of formula:



wherein q is 0 -- 3;

Z is carbon or silicon;

15 R³, R⁴ and R⁵ are the same or different, and are selected from the group consisting of H, C₁-C₁₀ alkyl substituted with 0-5 R⁶, aryl

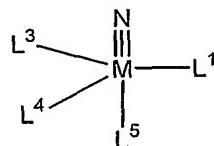
substituted with 0-5 R⁶, heteroaryl substituted with 0-5 R⁶, and macrocyclic crown ether containing 2-8 ether-oxygen atoms;

wherein R⁶ is selected from the group consisting of H, OH, OR⁷, C(=O)OR⁷, C(=O)NR⁸R⁹, PO(OR⁸)₂, PO(NR⁸R⁹)₂ and SO₂R⁷; and

R⁷, R⁸ and R⁹ are the same or different, and are selected from the group consisting of H, alkyl, aryl, and heteroaryl, or R⁸ and R⁹ together form a macrocyclic crown ether containing 2-8 ether-oxygen atoms.

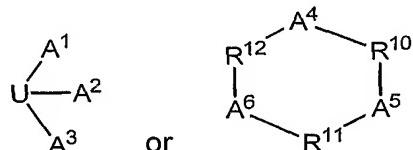
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41. The composition of Claim 1, wherein the compound further comprises L³, L⁴, and L⁵ and comprises a formula:



and pharmaceutically acceptable salts thereof;

15 wherein L³, L⁴, and L⁵ together form a tripodal chelator of formula:



wherein U is selected from the group consisting of R¹³B, CR¹³, and P(=O);

A¹, A² and A³ are imine-N containing heterocycles;

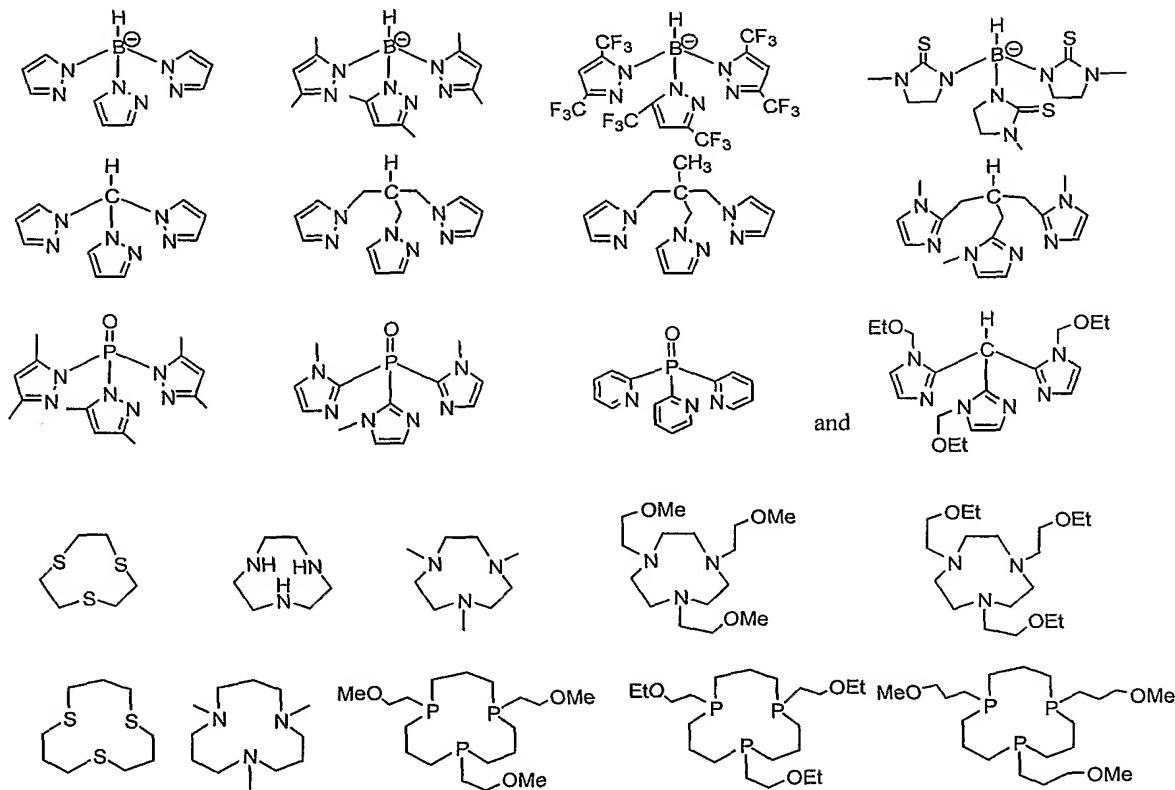
20 A⁴, A⁵ and A⁶ are selected from the group consisting of NR¹⁴, PR¹⁴, S, and O;

R¹⁰, R¹¹ and R¹² are selected from a group of formula -(CH₂)_g-; wherein g is 2-5;

25 R¹³ is selected from the group consisting of H, alkyl and aryl; and

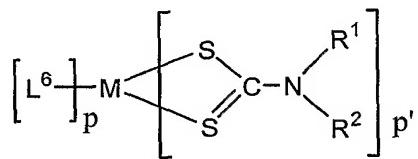
R¹⁴ is selected from the group consisting of H, alkyl, aryl, and alkoxyalkyl.

42. The composition of Claim 41, wherein the tripodal chelator is selected from the group consisting of



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43. A composition comprising a compound comprising a formula:



and pharmaceutically acceptable salt thereof;

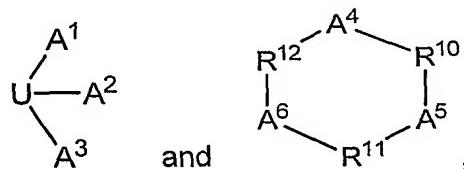
wherein M is a transition metal selected from the group consisting of
 10 Fe(II), Fe(III), Mn(II), Mn(III), Co(II), Co(III), Ni(II), Cu(II), Zn(II), Ru(II), Ru(III),
 Pd(II), and Pt(II);

p and p' are integers and are independently selected from 0-2;

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R^1 and R^2 comprise a crown ether-containing group of formula $[(CH_2)_a-O]_b-(CH_2)_c$, wherein a is at least 2, b is at least 3, and c is at least 2, or wherein R^1 and R^2 together comprise the crown ether-containing group;

5 L^6 is a tripodal chelator with a formula selected from the group consisting of



wherein U is selected from the group consisting of $R^{13}B$, CR^{13} , and $P(=O)$;

10 A^1 , A^2 and A^3 are imine-N containing heterocycles; A^4 , A^5 and A^6 are selected from the group consisting of NR^{10} , PR^{10} , and S ;

R^{10} , R^{11} and R^{12} are selected from a group of formula $-(CH_2)_g-$, wherein g is 2-5;

15 R^{13} is selected from the group consisting of H, alkyl and aryl; and R^{14} is selected from the group consisting of H, alkyl, aryl, and alkoxyalkyl.

44. A method for radioimaging a subject comprising:
- 20 a) providing
- i) a subject; and
 - ii) a composition comprising a compound comprising a formula $(M\equiv N)L^1$ and pharmaceutically acceptable salts thereof;
- 25 b) administering the composition to the subject; and
- c) scanning at least a portion of the subject using a radioimaging device;
- wherein N is nitrogen;
- M is a radioactive transition metal; and

L^1 is a first crowned dithiocarbamate, wherein the first crowned dithiocarbamate comprises a first crown ether-containing group of formula $[(CH_2)_a-O]_b-(CH_2)_c$, wherein a is at least 2, b is at least 3, and c is at least 2.

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45. The method of Claim 44, wherein at least a portion of the subject is tissue suspected of being diseased.

46. The method of Claim 44, wherein the at least a portion of the subject is 10 myocardial tissue.

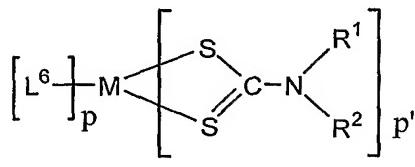
47. The method of Claim 44, wherein the subject is a mammal.

48. A method of treating a disease resulting from overproduction of nitric 15 oxide or reactive oxygen species, comprising:

a) providing:

i) a subject with a disease; and

ii) a composition comprising a compound comprising a formula:



20

and pharmaceutically acceptable salt thereof; and

b) administering the composition to the subject;

wherein M is a transition metal selected from the group consisting of Fe(II), Fe(III), Mn(II), Mn(III), Co(II), Co(III), Ni(II), Cu(II), 25 Zn(II), Ru(II), Ru(III), Pd(II), and Pt(II);

p and p' are integers and are independently selected from 0-2;

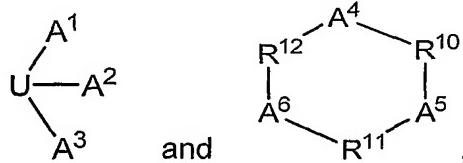
R¹ and R² comprises a crown ether-containing group of formula $[(CH_2)_a-O]_b-(CH_2)_c$, wherein a is at least 2, b is at least 3, and c is at

-82-

least 2, or wherein R¹ and R² together comprise the crown ether-containing group;

L⁶ is a tripodal chelator with a formula selected from the group consisting of:

5



wherein U is selected from the group consisting of R¹³B, CR¹³, and P(=O);

A¹, A² and A³ are imine-N containing heterocycles;

10

A⁴, A⁵ and A⁶ are selected from the group consisting of NR¹⁰, PR¹⁰, and S;

R¹⁰, R¹¹ and R¹² are selected from a group of formula (CH₂)_g⁻, wherein g is 2-5;

15

R¹³ is selected from the group consisting of H, alkyl and aryl; and

R¹⁴ is selected from the group consisting of H, alkyl, aryl, and alkoxyalkyl.

49. A method of treating metal poisoning, comprising:

20

a) providing:

i)

a subject with metal poisoning, and

ii)

a composition comprising a crowned dithiocarbamate;

and

b) administering the composition to the subject;

25

wherein the crowned dithiocarbamate comprises a crown ether-containing group of formula [(CH₂)_a-O]_b-(CH₂)_c, wherein a is at least 2, b is at least 3, and c is at least 2.